



Subject card

Subject name and code	Mechanics II, PG_00055119						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Oleksii Nosko					
	Teachers	dr hab. inż. Oleksii Nosko					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study		SUM
	Number of study hours	60	8.0		82.0		150
Subject objectives	To acquaint students with the basics of solid state mechanics, including: kinematics and dynamics. Developing the ability to solve practical problems covering the issues of kinematics and dynamics of a point, a rigid body in its translational, rotational and plane motion.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U06	Can properly interpret the results of research obtained on the basis of numerical calculations and computer simulations of developed mathematical models.			[SU1] Assessment of task fulfilment		
	K6_U01	Can obtain information from various sources of professional literature, as well as use and critically evaluate them.			[SU2] Assessment of ability to analyse information		
	K6_W04	Student is able to solve practical problems covering the issues of statics, kinematics and dynamics of a material point as well as a rigid body. Has a general understanding of modeling and can go from a real object through a physical model to a mathematical model. Has a basic knowledge of vibrations of the systems with one and many degrees of freedom.			[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURES: Introduction: Organization of classes and literature on the subject. Kinematics: Basic concepts of point kinematics: location, velocity and acceleration, motion equations. Description of point motion in alternative coordinates: rectangular, normal, polar. Tangent and normal components of acceleration. Particular cases of point kinematics. Kinematics of the solid. Basic concepts. The position of the solid, angular velocity and acceleration of the solid, and velocity and acceleration of point that belongs to the solid. Special cases of motion of solid: translational motion, rotational motion, planar motion. Relative motion. Coriolis acceleration. Dynamics: The notion the basic dynamics of material point. The special cases of equations of movement. Principle of dynamics. Work of force. Power of forces. The principle of energy and the work. Potential. Principle of behavior of mechanical energy. Differential figure of principle of energy and the work. Dynamics of arrangement of material points. The work of forces acting on arrangement of material points. The notion the basic dynamics of rigid body. The geometry of rigid bodies: mass moments of inertia. Steiners statement. Differential equations of translation, rotation and uniplanar motion of rigid body. The momentum, momentum of momentum and kinetic energy of rigid body in translation, rotation and uniplanar motion. Vibrations of mechanical systems.</p> <p>EXERCISES : Vector calculations. Point kinematics: differentiation and integration of motion equations. Kinematics of the points system. The kinematics of the solid, the temporal center of rotation. Arrangement and the solving the dynamic equations of movement of material point. d'Alembert principle. The principle of speed and the impulse as well as the principle the moment of momentum. Use of principle of energy and the work as well as the behaviour of energy. Calculation moments of inertia of rigid body. Use of dynamic equations of movement for translation, rotation and uniplanar motion of rigid body. The use of d'Alemberts principle, reactions of bearings. Vibrations of mechanical systems.</p>											
Prerequisites and co-requisites	Knowledge of physics and mathematics at an academic level, especially: geometry and trigonometry, differential calculus, vector and matrix calculus.											
Assessment methods and criteria	<table border="1" data-bbox="448 824 1498 936"> <thead> <tr> <th data-bbox="448 824 794 869">Subject passing criteria</th> <th data-bbox="794 824 1141 869">Passing threshold</th> <th data-bbox="1141 824 1498 869">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 869 794 902">Tutorials</td> <td data-bbox="794 869 1141 902">56.0%</td> <td data-bbox="1141 869 1498 902">50.0%</td> </tr> <tr> <td data-bbox="448 902 794 936">Lectures</td> <td data-bbox="794 902 1141 936">56.0%</td> <td data-bbox="1141 902 1498 936">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tutorials	56.0%	50.0%	Lectures	56.0%	50.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Hibbeler R.C. Engineering Mechanics. STATICS, PEARSON 2017 2. Hibbeler R.C. Engineering Mechanics. DYNAMICS, PEARSON 2017 3. Wittbrodt E., Sawiak S.: Mechanika ogólna. Teoria i zadania. Wyd. PG, Gdańsk 2014 										
	Supplementary literature	<ol style="list-style-type: none"> 1. Hendzel Z., Żylski W.: General Mechanics. Statics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 2. Hendzel Z., Żylski W.: General Mechanics. Kinematics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 3. 1.Hendzel Z., Żylski W.: General Mechanics. Dynamics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 4. Leyko J.: Mechanika ogólna, t. 1 i 2, PWN, Warszawa 2004, 5. Osiński Z.: Mechanika ogólna, PWN, Warszawa 2000, 6. Nizioł J.: Metodyka rozwiązywania zadań z mechaniki. WNT, Warszawa 2002, 7. Sawiak S., Wittbrodt E.: Mechanika. Wybrane zagadnienia. Teoria i zadania. Wyd. PG, Gdańsk 2007. 										
	eResources addresses	Adresy na platformie eNauczanie: Mechanics II, W/C, ZiIP, sem. 03, zima 24/25 (PG_00055119) - Moodle ID: 40979 https://eNauczanie.pg.edu.pl/moodle/course/view.php?id=40979										
Example issues/ example questions/ tasks being completed												

Work placement	Not applicable
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